

ATTACHMENT 1

Page 1 of 1 023-M-APHIS-03

CROP PROTECTION

Grasshopper/Mormon Cricket Program

Under the Crop Protection Program for grasshopper/mormon cricket control, full service contracts are contemplated. The Contractor shall provide all aircraft, pesticide, diluents including water with a pH of 7 or less, personnel, facilitating equipment and service. In this crop protection phase, a chemical treatment will be applied on range land adjacent to cropland.

Service will be requested by the COR on an as-needed basis. The Contractor shall report within 72 hours of notification by the COR. The COR will coordinate treatment areas to allow for efficient use of the contractor's resources. The type of pesticide will be determined by the COR at the time service is requested. The COR will inform the Contractor a minimum of 72 hours in advance of any changes in pesticide and/or diluents.

A job is defined as the total gallons or lbs requested at one time to be applied within the treatment location. Additional work is considered a new job. The treatment location is defined as the geographic area identified in the solicitation (frequently a county is the geographic area).

The Contractor must make satisfactory progress in completing the treatment service as determined by the COR.

In the event program requirements increase, the Government reserves the right to require additional aircraft of the same category. Up to 100 percent additional aircraft could be required to establish adequate crop protection. The Contractor will have the opportunity to supply the additional aircraft at the same price per gallon or lb. If additional aircraft cannot be supplied, the Government reserves the right to bring another Contractor into the same area.

The Government may reject an offer as nonresponsive if it is materially unbalanced as to prices for the various items and quantities. An offer is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

Since this requirement is for the crop protection phase of the grasshopper/mormon cricket control program, under a full service contract, the current Prospectus for aerial application is changed as follows:

Section I C. Gallons/lbs Plus or Minus 25 Percent

Percentage references are changed to read plus 100 percent or minus 100 percent.

Section I H. Reporting and Starting

Reporting and starting dates will be determined by the COR rather than the Contracting Officer. The 3 day advance notice is deleted and will be as stated in the individual solicitation, or as mutually agreed upon by the COR and Contractor.

Section I I. Operational Hours Allowed to Complete Program

Item 2 is deleted.

Section II S. Loading Equipment

In Item 1, delete the third sentence "The solicitation will specify how the pesticide will be delivered and whether it will require mixing."

Section II T. Responsibility for Pesticides

Revised to read "The Contractor shall furnish all pesticide and diluents, including water with a pH of 7 or less, as well as removal and disposal of any pesticide and diluent containers used on the program."

Add the following:

The following pesticides shall be used as required by the COR:

1. Malathion, ULV Concentrate (0,0-Dimethyl Phosphorodithioate of Diethyl Mercaptosuccinate) containing a minimum of 91 percent active ingredients, having inherent chemical and physical properties that make possible its direct use without additives.

2. Sevin XLR Plus carbaryl, (1-Naphthyl Methylcarbamate)

3. Dimilin 2L, diflubenzuron, N-[(4-chlorophenyl)amino]carbonyl]-2, 6-difluoro benzamide

4. Carbaryl Bran Bait

The pesticides furnished under any contract awarded as a result of this solicitation shall be registered and labelled in compliance with the Federal Pesticide, Fungicide, and Rodenticide Act of 1947 and the Federal Environmental Pesticide Control Act of 1972, as applicable.

Section III B. Pesticides -- Delete

Section IV J. Cost of Pesticide Lost -- Delete

REGISTER OF WAGE DETERMINATIONS UNDER
THE SERVICE CONTRACT ACT
By direction of the Secretary of Labor

U.S. DEPARTMENT OF LABOR
EMPLOYMENT STANDARDS ADMINISTRATION
WAGE AND HOUR DIVISION
WASHINGTON, D.C. 20210



William W. Gross
Director

Division of
Wage Determinations

Wage Determination No.: 1995-0222
Revision No.: 12
Date of Last Revision: 09/04/2001

Nationwide: Applicable in the continental U.S. Alaska and Hawaii.

**** Fringe Benefits Required Follow the Occupational Listing ****

Employed on U.S. Government contracts for aerial photographer, aerial seeding, aerial spraying, transportation of personnel and cargo, fire reconnaissance, administrative flying, fire detection, air taxi mail service, and other flying services.

OCCUPATION TITLE	MINIMUM WAGE RATE
Aerial Photographer	10.70
Airplane Pilot	21.45
First Officer (Co-Pilot)	19.52

EXCEPT SCHEDULED AIRLINE TRANSPORTATION AND LARGE MULTI-ENGINE AIRCRAFT SUCH AS THE B-727, DC-8, AND THE DC-9.

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

HEALTH & WELFARE: \$2.02 an hour or \$80.80 a week or \$350.13 a month.

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4.174)

VACATION (Hawaii): 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 10 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HEALTH & WELFARE (Hawaii): \$0.93 an hour for all employees on whose behalf the contractor provides health care benefits pursuant to the Hawaii prepaid Health Care Act. For those employees who are not receiving health care benefits mandated by the Hawaii prepaid Health Care Act, the new health and welfare benefit rate will be \$2.02. For information regarding the Hawaii prepaid Health Care Act, please contact the Hawaii Employers Council.

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordinance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordnance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordnance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordnance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordnance, explosives, and incendiary material differential pay.

**** UNIFORM ALLOWANCE ****

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of \$3.35 per week (or \$.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

**** NOTES APPLYING TO THIS WAGE DETERMINATION ****

Source of Occupational Title and Descriptions:

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations," Fourth Edition, January 1993, as amended by the Third Supplement, dated March 1997, unless otherwise indicated. This publication may be obtained from the Superintendent of Documents, at 202-783-3238, or by writing to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Copies of specific job descriptions may also be obtained from the appropriate contracting officer.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C){vi}} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

- 1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s).
- 2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees

themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.

3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).

4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.

5) The contracting officer transmits the Wage and Hour decision to the contractor.

6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

**** OCCUPATIONS NOT INCLUDED IN THE SCA DIRECTORY OF OCCUPATIONS ****

Aerial Photographer

The aerial photographer must be skilled in reading flight maps, capable of assisting the pilot to adhere to flight lines, be able to level and operate a cartographic camera and its auxiliary equipment mounted in the aircraft so that the photographs that are taken will have the required forward lap and side lap for use in photogrammetric mapping equipment, and possess a working knowledge of aerial films and camera filters to insure proper exposure of the films.

First Officer (Co-Pilot)

Is second in command of commercial airplane and its crew while transporting passengers, mail, or other cargo on scheduled or nonscheduled flights. Assists or relieves an airline captain in operating the controls of an airplane; monitoring flight and engine instruments; and maintaining air-to-ground communications.

ATTACHMENT 3

Page 1 of 3 0 23-M-APHIS-03

REFERENCED CONTRACT CLAUSES

Contract clauses are incorporated herein by reference and are made a part of this contract with the same force and effect as those set forth in full text. All of the references are from the Federal Acquisition Regulation (48 CFR Chapter I) unless otherwise indicated. The month and year of each clause applicable to this contract are shown in parenthesis following the clause title. Contractors are CAUTIONED that they should not alter any of the clauses listed below. The complete text of any or all of the clauses referenced herein may be obtained by submitting a request, identifying the Prospectus number, to the Department of Agriculture office issuing the Prospectus. Complete copies of the FAR in loose-leaf or CFR form may be purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. (Clauses that deviate from the text as shown in the FAR shall be annotated with DEVIATION after the title and date.)

CLAUSE REFERENCE

TITLE and DATE

SECTION E - INSPECTION AND ACCEPTANCE

52.246-4	INSPECTION OF SERVICES - FIXED PRICE (AUG 96)
52.246-16	RESPONSIBILITY FOR SUPPLIES (APR 84)

SECTION F - DELIVERIES OR PERFORMANCE

52.211-11	LIQUIDATED DAMAGES - SUPPLIES, SERVICES OR RESEARCH AND DEVELOPMENT (Sept 2000)
-----------	---

SECTION I - CONTRACT CLAUSES

52.202-1	DEFINITIONS (MAY 01)
52.203-3	GRATUITIES (APR 84)
52.203-5	COVENANT AGAINST CONTINGENT FEES (APR 84)
52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT (JUL 95)
52.203-7	ANTI-KICKBACK PROCEDURES (JUL 95)
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL ACTIVITY (JAN 97)
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED OR PROPOSED FOR DEBARMENT (JUL 95)
52.215-2	AUDIT AND RECORDS - NEGOTIATION (JUNE 99)
52.216-21	REQUIREMENTS (OCT 95) (CROP PROTECTION ONLY)
52.219-6	NOTICE OF TOTAL SMALL BUSINESS SET-ASIDE (JUL 96)
52.219-8	UTILIZATION OF SMALL BUSINESS CONCERNS (OCT 2000)
52.222-1	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FEB 97)
52.222-3	CONVICT LABOR (AUG 96)
52.222-4	CONTRACT WORK HOURS AND SAFETY STANDARDS ACT-OVERTIME COMPENSATION (SEPT 2000)
52.222-26	EQUAL OPPORTUNITY (FEB 99)
52.222-35	AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM VETERANS (APR 98)
52.222-37	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (JAN 99)
52.222-41	SERVICE CONTRACT ACT OF 1965, AS AMENDED (MAY 89)
52.222-44	FAIR LABOR STANDARDS ACT AND SERVICE CONTRACT ACT PRICE ADJUSTMENT (MAY 89)
52.223-3	HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA (JAN 97)
52.223-6	DRUG-FREE WORKPLACE (JAN 97)
52.227-1	AUTHORIZATION AND CONSENT (JUL 95) [] ALT [I ALT II
52.227-2	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (AUG 96)
52.229-3	FEDERAL, STATE, AND LOCAL TAXES (JAN 91)
52.229-5	TAXES-CONTRACTS PERFORMED IN U.S. POSSESSIONS OR PUERTO RICO (APR 84)
52.232-1	PAYMENTS (APR 84)
52.232-8	DISCOUNTS FOR PROMPT PAYMENTS (MAY 97)
52.232-11	EXTRAS (APR 84)
52.232-17	INTEREST (JUN 96)
52.232-23	ASSIGNMENT OF CLAIMS (JAN 86)
52.232-25	PROMPT PAYMENT (MAY 01)
52.233-1	DISPUTES (DEC 98)
52.233-3	PROTEST AFTER AWARD (AUG 96)
52.236-7	PERMITS AND RESPONSIBILITIES (NOV 91)
52.243-1	CHANGES - FIXED PRICE (SUPPLY) (AUG 87)
	[] ALT I and ALT II (APR 1984)

ATTACHMENT 3

Page 2 of 3 023-M-APHIS-03

52.245-2	GOVERNMENT PROPERTY (FIXED-PRICE) (DEC 89) [] ALT I (APR 84)
52.246-25	LIMITATION OF LIABILITY SERVICES (FEB 97)
52.249-4	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT
	(SERVICES) (SHORT FORM) (APR 84)
52.249-8	DEFAULT (SUPPLY AND SERVICE) (APR 84)

APPLICABLE TO CONTRACTS OVER \$100,000

52.203-12	LIMITATION OF PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JUN 97)
-----------	--

APPLICABLE TO CONTRACTS OVER \$500,000

52.230-1	COST ACCOUNTING STANDARDS NOTICES & CERTIFICATION (JUNE 2000)
52.230-2	COST ACCOUNTING STANDARDS (APR 98)
52.230-3	DISCLOSURE AND CONSISTENCY OF COST ACCOUNTING PRACTICES (APR 98)
52.230-4	CONSISTENCY IN COST ACCOUNTING PRACTICES (AUG 92)
52.230-6	ADMINISTRATION OF COST ACCOUNTING STANDARDS (NOV 99)

SECTION L - INSTRUCTIONS, CONDITIONS, AND NOTICES TO OFFERORS

APPLICABLE TO NEGOTIATED SOLICITATIONS

52.215-5	FACSIMILE PROPOSALS (OCT 97)
52.232-8	DISCOUNTS FOR PROMPT PAYMENT (MAY 97)
52.233-3	PROTEST AFTER AWARD (AUG 96)

SIZE-STANDARD AND NAICS CODE INFORMATION (NOV 96)

The North American Industry Classification System and size standard describing the products and/or services to be acquired under this solicitation are listed below.

Contract line item: All

NAICS Code: 115112

Size standard: 6 million.

(AGAR 452.219-70)

SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in Section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO) or the General Services Administration Board of Contract Appeals (GSBCA), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from Robert Crowther, USDA, APHIS, FSO, Contracting Self Managing Team, Butler Square, Fifth Floor, 100 North Sixth Street, Minneapolis, MN 55403.

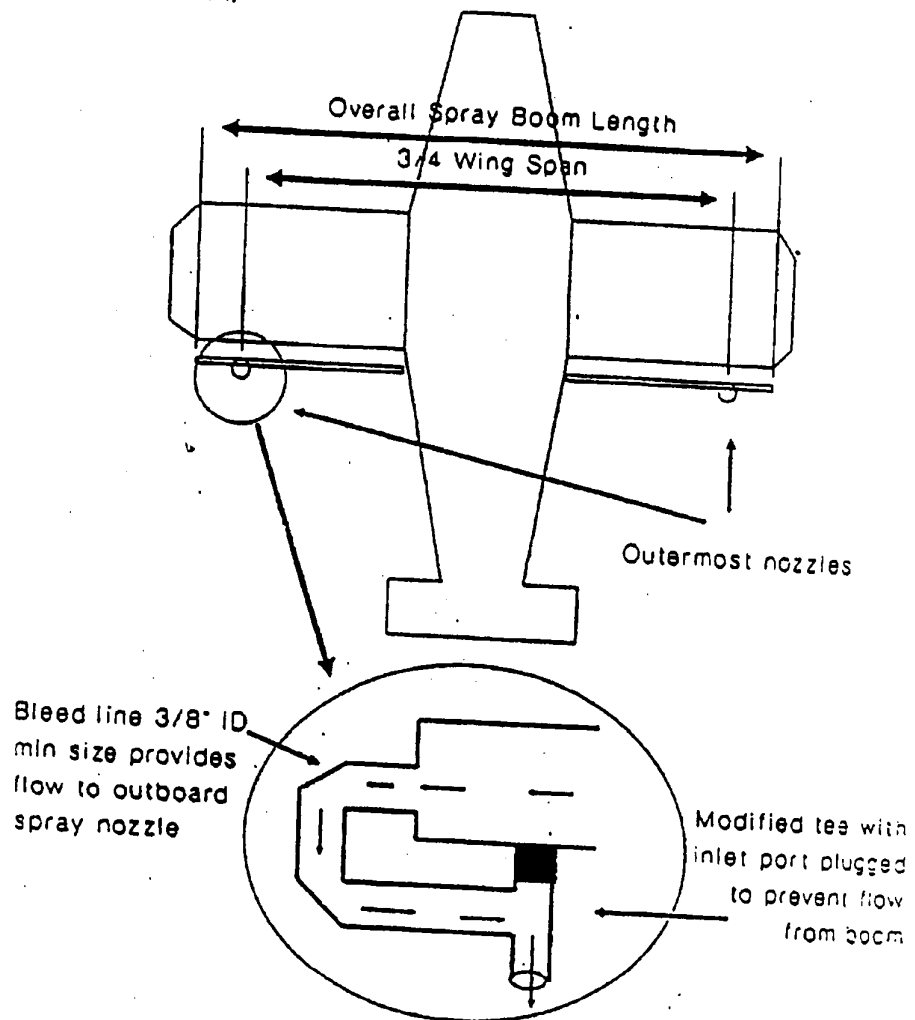
(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO. (FAR 52.233-2)

STATEMENT OF EQUIVALENT RATES FOR FEDERAL HIRES (MAY 1989)

PPQ FORM 816
MAY 2000

Attachment 5
Prospectus

ATTACHMENT 5 - AIRCRAFT SPRAY SYSTEM MODIFICATION
(DIAGRAM)



Aircraft spray system modification required to prevent
entrapment of air and assure dribble-free shut-off.

ATTACHMENT 3

Page 3 of 3 023-M-APHIS-03

In compliance with the Service Contract Act of 1965, as amended, and the regulations of the Secretary of Labor (29 CFR Part 4), this clause identifies the classes of service employees expected to be employed under the contract and states the wages and fringe benefits payable to each if they were employed by the contracting agency subject to the provisions of 5 U.S.C. 5341 or 5332. THIS STATEMENT IS FOR INFORMATION ONLY; IT IS NOT A WAGE DETERMINATION.

Employee Class	Monetary Wage	Fringe Benefits
Pilot	\$20.64	\$2.02 per hour
Aircraft Mechanic Journeyman	\$18.78	\$2.02 per hour
Aircraft Mechanic Junior	\$18.78	\$2.02 per hour
Aircraft Mechanic Helper/Cleaner	\$11.26	\$2.02 per hour
Laborer	\$11.26	\$2.02 per hour

(FAR 52.222-42)

Telegram, mailgram, and facsimile bids are authorized. Western Union transmission of message via telephone is not acceptable. Offerors must mail immediately written confirmation of any offer submitted by telegram or mailgram. The undersigned agrees to furnish any and all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified herein.

ATTACHMENT 6

WHEAT BRAN APPLICATION ONLY

Page 1 of 3 023-M-APHIS-03

Equipment Modification, Swath Width Determination, and Calibration for Aerial application of Bran Bait with Single-Engine Fixed Wing Aircraft.

Under certain conditions, bran bait is the best choice for controlling grasshoppers. Bait is commonly applied by ground equipment, but in many cases, rough terrain and/or extensive acreage make application by air necessary. Until recently, the acceptance of aerial application of bran bait has been hindered by the common occurrence of nonuniform application and the difficulty in calibrating the equipment accurately. Both problems are caused by uneven flow of bait from the hopper of the aircraft to the spreader.

This uneven flow usually results from what is commonly referred to as "bridging", the formation of both a cavity in the lower portion of the bait load and an overlying bridge of bait. As bait flows from the bottom of the hopper to the spreader, the load in the hopper settles. Because the particles of bait are flat, they tend to overlap, layer, and lock, and together to form a bridge. If the overlying bridge does not break and fall before all of the lower bait is applied, continuous flow of bait will be interrupted and nonuniform application will result.

Equipment Fabrication and Modification

Aerial application of bait requires the use of what are commonly called granular spreaders. These spreaders are used for aerial application of dry solid materials, such as fertilizers, herbicides, and seeds. Several different spreaders are available commercially, and some acceptable homemade types undoubtedly exist. To ensure a uniform application, each type of spreader must be evaluated with the type of aircraft on which it will be used. To date, U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA, APHIS) has evaluated and approved several aircraft and spreaders for aerial application of bran baits (table 1).

Uniform flow of dry bait is a function of several factors, including the slope of the aircraft hopper, the physical shape (flatness) of the bait particles, the size of the opening of the gate seal assembly through which the bran is released from the hopper of the aircraft into the spreader, and the small amount of bait per acre that is usually desired for delivery. All of these factors contribute to bridging in the aircraft hopper, which prevents a consistent and uniform flow of bait to the spreader.

Three inexpensive, simple additions and modifications to the aircraft are required to ensure uniform delivery of bait. A ram air agitation system-consisting of a ram air tube, air agitation tube, and a vent tube air regulator-must be adapted to the aircraft.

Air Agitation Tube

This tube directs air forced from the ram air tube to the inside lower area of the hopper. The moving air is forced up toward the bottom of the bait load and agitates the bait particles to prevent bridging. In addition, the air mixes with the bait particles to allow a uniform flow of material to the spreader. You can build the air agitation tube using Federal Aviation Administration approved pipe and fittings. The pipe size shall have an inside diameter of 1 to 1.5 inches and shall be installed across the entire width of the hopper throat just above the gate opening (figure 2). A series of 1/4 inch diameter, equally spaced holes is drilled across the upper side of the pipe and alternately angled to direct airflow to the fore and aft lower portion of the hopper walls. The number of holes can vary, but their accumulated area must not exceed 75 percent of the pipe's inside diameter area. Therefore, a 1 inch diameter pipe should not have more than 12 holes, and a 1.5 inch pipe should not have more than 27 holes. All 1/4 inch holes are covered with window screen to prevent the entry of material into the air agitation tube.

Ram Air Tube

This tube collects and directs forced air from outside the aircraft into the air agitation tube located in the bottom of the aircraft hopper. This supply of forced air can be provided in one of two ways.

1. Insert a pipe through the side opening of the hopper subtank (figure 1) with spray valve removed and position the open end forward at approximately a 45-degree angle to the slipstream to allow for uninterrupted ram air during flight. The opposite end of the air agitation tube inside the hopper must be tightly sealed.
2. Install a pipe tee at the proper location in the agitation tube and insert a pipe through the opening that supplies the pump for spray operations. Position the open end forward to allow for uninterrupted ram air during flight (figure 5&6). When this modification is used, the ends of the air agitation tube inside the hopper must be tightly sealed (figure 6).

Vent Tube Air Flow Regulator

The existing hopper vent tube can be modified easily to function as a flow regulator for the bait. The flow regulator works on the same principle as two holes in the top of an oil can. When fluid is poured out of one hole, the opposite hole serves to prevent a vacuum from building up in the can. In the aircraft system, the hopper opening is similar to the hole in an oil can. The vent tube is similar to the second hole in the oil can, which prevents a vacuum. By simply restricting the amount of air that is allowed to enter the hopper vent tube, one can reduce the speed that bran is delivered through a fixed hopper-gate opening. Very minor changes in the amount of air allowed into the vent tube can cause major changes in the amount of bait delivered.

A sheet metal sleeve is fashioned and attached to the vent tube to the aircraft hopper (figure 3). Other materials of duct tape can be used to produce similar results.

Other Requirements

The aircraft hopper-gate seal must be clean, dry (not sticky), and in good condition across its entire length to prevent an accumulation of material along the seal and edge of the gate when it is opened. An accumulation of bait on the gate seal can prevent uniform distribution into the spreader and, in some cases, can even promote bridging in the hopper. Linkage between the gate and its cockpit control handle must be in good condition or the gate may not stop in the same position each time it is opened. Gate stops are also required to insure that the hopper gate is opened to exactly the same position each time. Screw type stops are preferred.

Seal all openings where the ram air tube enters the subtank of the hopper. Doing this prevents leakage of bait from the aircraft and ensures a sufficient and constant amount of air entering the air agitation tube. Remove all mechanical agitation components, nonstructural baffles, and other nonstructural obstructions from the hopper interior. Any unnecessary object can act as an anchor for the buildup of bait and thus promote bridging.

If present, the side-loader flapper valve inside the hopper should be sealed and covered to reduce protrusions. Doing that prevents dry material from entering the system when used for liquid application. Covering all protrusions reduces the chance of material buildup, which can promote bridging. The hopper interior must be thoroughly clean and dry to prevent the buildup of bait.

Determining Swath Width

The swath width for wheat bran bait applications will differ among types of aircraft. With baits, different types of spreaders on the same type of aircraft can produce different swath widths. Other differences among the aircraft, such as landing gear configuration, automatic flagman equipment, and weight, may also result in different swath widths.

Any combination of aircraft, spreader, and spreader attachments that has not been previously evaluated for swath widths must be determined.

The hopper interior must be completely dry before loading the bait. A proven technique for ensuring this is to fly the aircraft for several minutes with the hopper empty and the hopper gate open.

Load a sufficient amount of bran bait into the hopper to conduct swath evaluations. For determining the swath width, the rate of bait flow (application rate) is unimportant as long as bait being dispensed by the aircraft can be seen in the air by observers from the ground. The hopper gate opening should be set wide enough to make certain that bridging is not occurring. A setting that allows for a gate opening of 1/4-in or more is usually sufficient.

Conduct swath evaluations in a relatively flat area free of obstructions. Collection devices, such as pans, paper plates, or sticky cards, should be placed in a line 200 ft long perpendicular to the planned flightline. Place collection devices at 5-ft intervals along the line.

Conduct all flights to determine swath widths during no-wind conditions or by flying into a wind that does not exceed 5 miles per hour, (mph). The aircraft must be in level flight and at the proper operating speed and altitude for at least 1,000 ft before collection devices. To ensure that bait will hit the collection devices, open the hopper gate at 500 ft before reaching the collectors and leave it open until the aircraft has passed the devices by 1,500 ft.

After each flight, inspect all collection devices and count and record the number of particles in each device. The overall swath width is the distance between the extreme collection devices that caught at least 1 particle of bait. Collection devices in the middle portion of the overall swath will contain many more particles than the devices on either end.

In many cases, the overall swath width ends abruptly in either end and is very obvious. The effective or working swath width (overall swath width minus 10 ft) is the swath width that will be used in the calculations for calibration and during the actual application. At least three good swath-width test flights are recommended.

Calibration

Calibration is simply comparing the amount of material that was applied to a given area for a given period of time during a test flight with what is desired to be applied to that area. Make adjustments in the system until agreement is reached.

After determining the swath width and the ground speed of the aircraft, determine the number of acres that will be treated in a minute. To do this, multiply the ground speed times the swath width and divide by 495 (a constant). For example, 120 mph times an 80 ft-swath divided by 495 equals 19.39 ac/min. By multiplying the acres per minute times the amount of bait desired per acre, you can determine the amount of bait that should be applied in 1 minute. For example, if 1.5 lb of bait per acre is desired, then from the above example, 1.5 times 19.39 ac/min equals 29.09 lb of bait, the amount that should be applied in 1 minute.

For the first flight, the gate opening should be set at 1/4-in. The shank of 1/4-inch drill bit can be used as a gauge. You will need an apparatus to drain and recover wheat bran from the aircraft hopper and a scale to weigh the bait. Weigh the bait to be loaded into the aircraft. Actual weight may vary slightly from that printed on the bag. Use the actual measured weight. Load the hopper with approximately 50 lb of bait plus the amount of bait to be applied in 1 minute to ensure that you will not run out of bait during the calibration flight. If there is no bait left in the hopper after a flight, overapplication was occurring; appropriate adjustments must be made, and the flight must be repeated.

Make all calibration flights crosswind and dispense bait for 1 minute. Flying upwind will increase the rate of application. Use a stopwatch to determine the exact amount of time the hopper gate is open. Timing devices attached to the application system may increase the accuracy.

After the first calibration flight, drain and weigh all bait remaining in the hopper. Make sure bait that may have fallen into the spreader during draining is included. Subtract this weight from the weight loaded. Compare the amount of bait applied to what was desired to be applied. If the application rate per minute is below the desired rate, increase the gate opening and conduct another calibration flight.

If the application rate per minute exceeded the desired rate, do not change the gate opening. Cover about half of the hopper air vent. Use the fabricated airflow regulator or duct tape. Reducing or enlarging the vent opening changes the internal pressure in the hopper, decreasing or increasing the flow rate respectively. Make a second calibration flight.

If after the second flight the flow per minute still exceeds the desired rate, further reduce the vent opening and conduct another calibration flight. Do this until the application rate equals the desired rate. Calibration accuracy should be within 10 percent of the desired rate. A minimum of three consecutive acceptable calibration flights at the same settings will assure accurate application.

Safety and Storage

Before imitating a treatment for grasshopper or Mormon Crickets with wheat bran bait, always read the label carefully. Keep wheat bran dry during storage in enclosed buildings, trailers, or vans to eliminate the risk of the bait's becoming unusable. Also, keep bait in a cool location. Hot storage for long periods of time may cause the bait to become rancid and reduce effectiveness. Dispose of empty bags or containers according to State and Federal regulations printed on the label.

Potential Problems

The following lists identify some of the problems that most commonly occur with calibration and application of wheat bran baits.

Equipment

- * Improper or no modifications or fabrication
- * Nonstructural hopper baffles not removed.
- * Airholes not covered with screen on agitation tube.
- * Hopper gate seal not clean and dry.
- * Side-loader flapper valve inside hopper not sealed.
- * Air and agitation tube connection and alignment not proper.
- * Loose gate linkage.
- * Gate setting stop not in place.
- * Gate setting screw jack moves.
- * Hopper doors usually leak. Always cover in case of rain.

Material

- * Lumps in bait from commercial formulation.
- * Strings and/or paper in bait from the container or bag.
- * Rocks, pebbles, or other objects in bait.
- * Clumped bait due to moisture.
- * Weight printed on bag or container inaccurate.
- * Different types of bran or bran sources.
- * Different formulations of bait.

Methodology

- * Failure to follow guidelines.
- * Failure to open hopper gate firmly and consistently.
- * Inaccurate weighing during calibration and application.
- * Failure to read scales accurately.
- * Bait left in throat of spreader when weighing during calibration.
- * Bait left in hopper when weighing during calibration.
- * Calibration loads inconsistent in weight.
- * Uneven load during calibration flights.
- * Calibration runs not conducted crosswind.

Weather Conditions

- * Damp or wet hopper due to condensation or rain.
- * Large humidity changes may change calibration.

Conclusion

The problems associated with accurate calibration and consistent application of bran bait by air have been identified. Solutions to the problems and procedures for implementing the solutions have been developed and refined. Both solutions and procedures are inexpensive. With experience, accurate calibration and application of bran bait by air can now be expected.

Table 1-Aircraft/spreader combinations that have been certified and swath widths assigned for applying wheat bran bait.

Aircraft Make/Model	Spreader Make/Model	Altitude	Swath
Cessna 188	Transland 20241/20244	50 ft	45 ft
Turbine Thrush	Transland 20250	50 ft	45 ft
Bull Thrush	Transland 22007	100 ft	100 ft

NOTE: When calibrating and/or swath checking for wheat bran bait applications, be cautioned that additional flight time will be required between the reporting date and starting date.

Any questions or concerns regarding this information can be addressed to Tim Roland (956) 580-7270 or Nelson Foster (602) 437-1295.